Pulmonary mucormycosis in a patient with chronic obstructive pulmonary disease: Diagnosis by fine needle aspiration cytology

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Pulmonary mucormycosis is a rare opportunistic infection caused by invasive filamentous fungi of the class Zygomycetes belonging to the order Mucorales.[1] Mucormycosis most frequently occurs in diabetic individuals, immunosuppressed patients on chronic steroids, patients with hematologic malignancies, or solid organ or bone marrow transplant recipients. There have been only 2 case reports of pulmonary mucormycosis in patients with chronic obstructive pulmonary disease (COPD) who have been treated with oral steroids.[2,3]

We report a patient with COPD who presented with pulmonary masses. Diagnosis of the mucormycosis was made by fine needle aspiration cytology (FNAC).

Clinical Summary

A 72-year-old African-American woman who was a heavy smoker was admitted with shortness of breath and chest pain. She had a myocardial infarction (MI) 8 months previously, which was followed by a double-vessel coronary artery bypass grafting (CABG) surgery. The patient developed deep vein thrombosis and bilateral pulmonary embolism (PE) 2 months after the surgery and was incidentally found to have a spiculated 2.5-cm left lower lobe lung mass in spiral computerized tomography (CT) of the chest. However, further workup of the mass was deferred because of her acutely worsened condition due to PE. She did not have diabetes mellitus and denied previous oral steroid treatment except for a 10-day short course of prednisone for presumed COPD exacerbation during her hospitalization 6 months ago.

Physical examination revealed an obese woman with decreased O_2 saturation at 88% on room air. The patient had significant wheezing in both lung fields. Her legs were swollen with tenderness of the left calf. Laboratory analysis including a complete blood count, chemistry, and cardiac enzymes was remarkable only for a slightly elevated white blood cell count at 10,700/mm^3. Her international normalized ratio was 1.1 despite coumadin treatment.

The patient was initially worked up for a possible PE. A spiral CT of the chest did not show any evidence of PE; however, a new pulmonary mass was detected in the posterior aspect of right upper lobe in addition to her left-sided lesion (Figure 1). Pulmonary function tests (PFTs) showed a low forced expiratory volume in 1 second of 0.51 L and a forced vital capacity of 0.93 L. Bronchoscopy was not performed because the patient was at increased risk for respiratory failure. Instead, she underwent an FNAC of the right apical lesion, which showed abundant broad, ribbonlike, nonseptated fungal elements with right angle branching, consistent with mucormycosis (Figure 2). However, fungal cultures from aspiration specimen and sputum samples were negative.

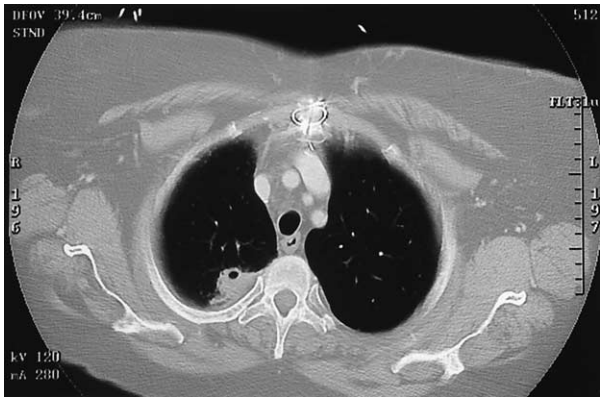

Figure 1. Computerized tomography of the chest showing cavitated right upper lobe lesion.

Surgery was deferred because of low PFTs, poor general condition, and bilateral disease. The patient was subsequently started on amphotericin B lipid complex (Abelcet; Enzon Inc, Bridgewater, NJ) at a dose of 5 mg/kg. However, she tolerated the drug very poorly and required dose adjustments, a few days of treatment interruptions, and finally a switch to liposomal amphotericin B (Ambisome; Fujisawa Healthcare Inc, Deerfield, Ill) after 2 weeks because of deteriorating renal function despite aggressive hydration.

At week 10 of treatment, the patient had a generalized seizure. A CT scan of the head showed the presence of 2 hypodense masses in the left frontal and right frontoparietal regions. A CT scan of the chest showed only minor improvement in the size of the lesions. The patient refused further diagnostic studies and treatment with amphotericin B and was discharged from the hospital. The patient died 4 weeks later.

Discussion

Pulmonary mucormycosis is a rare fungal infection primarily affecting immunocompromised patients. To our knowledge, 2 previous cases of mucormycosis in COPD patients associated with steroid use have been reported.[2,3] Moreover, 1 of those reported patients had diabetes mellitus, which probably was the primary predisposing factor.[2] Our patient is unique in that she did not have

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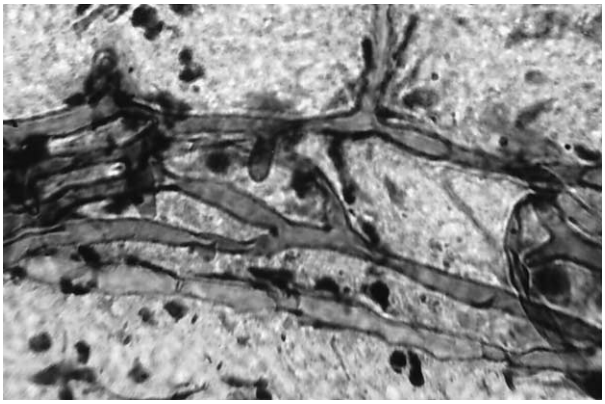

Figure 2. Photomicrograph of the fungal elements seen in the fine needle aspirate of the right posterior lung lesion. Papanicolau stain; original magnification, 600× under oil immersion.

any history of chronic steroid use in the past or any other predisposing factors.

Nosocomial mucormycosis may develop in patients who are hospitalized in intensive care units (ICUs) for prolonged periods and are relatively immunosuppressed as a result of malnutrition and medications.[1] The emergence of pulmonary masses after MI and CABG surgery and short-term ICU stay may indicate another feasible predisposing cause for pulmonary mucormycosis in our patient.

Histopathologic identification of nonseptated, ribbonlike, irregular hyphea with right angle branching is essential for diagnosis. Fungal cultures are frequently negative in more than half of the cases. FNAC has been reported to be an effective tool to diagnose pulmonary mucormycosis with characteristic appearance of the hyphea.[4] Our patient is the second case reported in the literature diagnosed with FNAC of the pulmonary lesion. This report further illustrates the importance of FNAC in rapid and relatively noninvasive diagnosis of pulmonary mucormycosis.

The outcome of patients with pulmonary mucormycosis is particularly poor. The prognosis is largely determined by the underlying predisposing condition and the extent of tissue invasion. The mainstay of treatment is aggressive surgical debridement combined with antifungal chemotherapy using amphotericin B.[5] Treatment of mucormycosis in patients with COPD is further challenged by the fact that these patients often are not candidates for definitive surgical resection. Because amphotericin B is the only effective antifungal agent available, poor tolerability and side effects make the treatment more difficult. Therefore, early diagnosis is crucial to improve treatment outcome with potential cure by surgical resection where possible.

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